

EXECUTIVE DEVELOPMENT

STANDARD OPERATING PROCEDURES FOR SINGLE-FAMILY DWELLING

FIRES

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LINCOLN FIRE AND RESCUE

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AN APPLIED RESEARCH PROJECT AS PART OF THE EXECUTIVE FIRE

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## ABSTRACT

The problem is that uniformed members of Lincoln Fire and Rescue operate at single-family dwelling structure fires with a different set of informal procedural expectations depending upon which battalion chief is in command. Confusion often ensues among the responding uniformed members that could lead to poor and unsafe fire scene decision-making. The purpose of this research was to compare tactical procedures for single family dwelling fires from departments of similar size and composition to Lincoln Fire and Rescue and determine their processes for decision making at these types of incidents. This research project utilized descriptive research to answer the following questions: (1) what tactical procedures are used at single-family dwelling fires by departments of similar size and composition to Lincoln Fire and Rescue (2) how do these department's practices ensure safe operations at single-family dwelling fires (3) how are these practices developed (4) what steps are used to implement these practices?

18 departments similar in size and composition to Lincoln Fire and Rescue were surveyed about their practices for single-family dwelling fires. They were asked if they had a specific policy for these types of incidents and how the policy was developed. If a department did not have a specific policy, they were asked about their common practices at dwelling fires and their development.

Research found that most departments do not use a specific policy or procedure for single-family dwelling fires, but rather a combination of guidelines was often utilized. Many departments incorporated standard company responsibilities with training in order to optimize their operations.

This research project led to the recommendations of developing a unified departmental philosophy for all structural fire operations, implementation of a flexible guideline to assist in decision making on structure fires, and utilization of skills training related to expectations on structural fire incidents.

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## STANDARD OPERATING PROCEDURES FOR SINGLE-FAMILY DWELLING FIRES

### INTRODUCTION

Fire departments across the United States respond to thousands of structure fires each day. The majority of these responses are to single-family dwelling fires, where most civilian fire fatalities occur. The National Fire Protection Association (NFPA) estimates that 2,350 civilians died in residential structure fires during the year 2007, which was an increase of 9.1% from 2006. (Karter, 2008, p. 7) While public education activities, strict fire and building codes, and promoting residential fire sprinklers are critical links in preventing these deaths, it is still the fire service's responsibility to perform the act of rescuing civilians and mitigating these incidents when they occur. The high incidence of these types of responses in some locales often places single-family dwellings in the "routine" response category; this can cause firefighters to become complacent in their actions during firefighting activities. Analysis of firefighter line-of-duty injuries and deaths reveal that 72% of firefighter injuries and 50% of annual firefighter line-of-duty deaths (related to structure fire operations) occur while operating at single-family dwelling fires. (United States Fire Administration, 2002, ¶3 and Karter, 2008, p. 25) In many cases, the causal factors leading to these casualties include not adhering to standard operating procedures, a lack of command and control, and a lack of situational awareness (National Institute of Occupational Safety and Health, 2006). Lincoln Fire and Rescue's most prevalent structure fire incidents occur at single-family dwellings (Lincoln Fire and Rescue, 2007b), which points to the necessity of preventing firefighter injuries and deaths

at residential fires through clear policies, sound decision making, and precise risk management.

The problem is that uniformed members of Lincoln Fire and Rescue operate at single-family dwelling structure fires with a different set of informal procedural expectations depending upon which battalion chief is in command. This causes confusion among the responding uniformed members that could lead to poor and unsafe fire scene decision-making. The purpose of this research is to compare tactical procedures for single family dwelling fires from departments of similar size and composition to LFR and determine their processes for ensuring sound decision making at these types of incidents. This applied research project utilizes the descriptive method of research to answer the following questions: (1) what tactical procedures are used at single-family dwelling fires by fire departments of similar size and composition to Lincoln Fire and Rescue (2) how do these procedures or departmental practices ensure safe operating practices at single-family dwelling fires (3) how are these operating practices developed (4) what steps are used to implement these operating practices?

## BACKGROUND AND SIGNIFICANCE

Lincoln Fire and Rescue serves a metropolitan population of 248,744 people in 82.75 Square Miles (Lincoln Fire and Rescue, 2007b, p. 8). The City is covered by 14 fire stations, with daily deployment of 14 engine companies, 4 truck companies, 5 medic units, and 2 battalion chiefs. Each shift complement consists of 18 captains (company officers), 18 fire apparatus operators, 18 firefighters, 23 firefighter/paramedics and two deputy chiefs (Lincoln Fire and Rescue, 2007b, p. 9). Suppression staff works an alternating 24-hour shift on duty with 24-hours off duty for two weeks, followed by eight

days off. Lincoln Fire and Rescue is an all-hazards agency that provides fire suppression, advanced life support emergency medical first response and transport services, hazardous materials response, and technical rescue response. During 2007, Lincoln Fire and Rescue responded to 19,075 incidents, of which 221 were confirmed structure fires (Lincoln Fire and Rescue, 2007b). Confirmed structure fires include fires with visible smoke and flames or structures in peril; these incidents receive a dispatch complement of three engine companies, two truck companies, a battalion chief, and a medic unit with total response staffing of 18-23 personnel. Of the 221 structure fires during the year 2007, 142 were in residential single-family dwellings; this constitutes the highest percentage of confirmed fire responses (Lincoln Fire and Rescue, 2008b). Furthermore, there are 72,521 residential units throughout Lincoln, which indicates a high likelihood of fire risk in these structures (Lincoln Fire and Rescue, 2008a, p. 62).

Lincoln Fire and Rescue utilizes management policies to dictate both administrative and operational practices within the department. Within these policies are procedures that comply with national consensus standards related to incident management. National Fire Protection Association Standard 1500 requires an incident management system that complies with NFPA 1561, the Standard for Fire Department Incident Management (National Fire Protection Association, 2007). National Fire Protection Association Standard 1561 identifies the command organization required for fire departments (National Fire Protection Association, 2002). For instance, Management Policy 851.01 requires that the first arriving member of the fire department at the scene of a structure fire shall establish command and initiate a size-up. The policy further delineates responsibilities of command, functions of command, standard radio reports to

be given, and command options. There are five command options. The investigation mode requires investigation by the first arriving unit. The working fire mode requires the first officer to decide how to commit incoming units when size-up and situation assessment determine that offensive interior operations will be conducted to stabilize the situation. The immediate rescue mode is utilized when there is an obvious need for an immediate rescue operation to be conducted by the first-arriving apparatus crew without establishing formal command. The quick attack mode allows the first arriving apparatus crew to initiate firefighting operations on an *incipient* fire (early stages of flame development) where the attack would have a significant impact on the fire. The defensive mode is utilized when a direct attack is not possible and the likelihood of saving lives or valuable property is unlikely (Lincoln Fire and Rescue, 2007b).

Typically, the first arriving company officer is tasked with conducting a *size-up* (assessment) and determining what mode his/her crew will utilize for that particular operation. After determining the mode of operation, assignments to all other incoming units are based upon the objectives (in priority order) rescue, exposures, confinement, extinguishment, overhaul, ventilation, and salvage. Currently, the process for determining whether the appropriate mode and assignments made at the scene of all fires, whether a single-family dwelling fire or large commercial facility fire are based upon opinion, past practice, and information from post-incident reviews. In most cases, deputy chiefs in charge of a battalion are tasked with providing expectations to their company officers and crews in regard to how they want the crews to operate. There are six deputy chiefs assigned to suppression functions; each one of them presents an unwritten set of expectations to their fire crews when they are promoted or transferred. Furthermore, the

exodus of experienced company officers due to retirement has initiated the promotion of new company officers with less than twelve years of service with LFR. The turnover causes a great deal of movement among all members of the department between stations and shifts, where members who were assigned to companies where expectations were defined by past chief and company officers may be entirely different. In addition, the loss of experienced chief and company officers also affects the department due to a learning curve required for experiential decision-making ability.

Most fire departments refer to fires occurring in a residential property (or single-family dwelling) as a *bread-and-butter fire*; one that is typically handled with a single-hose line and a small complement of personnel and apparatus. The reference to bread-and-butter correlates with the fact that the operation occurs with enough frequency that responders should be able to handle these responses without a great deal of difficulty and/or danger. Line of duty death statistics, however, prove that the fire in a single-family dwelling isn't necessarily so routine.

Firefighting, as a profession, remains one of the most hazardous occupations in the United States. In 2007, 118 firefighters died in the Line of Duty (United States Fire Administration, 2008, p. 10). 38 of the 118 firefighters died while engaging in activities at the scene of a fire. Furthermore, the United States Fire Administration reports that 68.1% of all firefighter injuries in the United States occur at residential properties (United States Fire Administration, 2008, p. 2). Nationally, 78% of the over 500,000 total structure fires occurred in single-family dwellings (Karter, 2008, p. 1). This data points to the fact that residential structural firefighting should not be minimized as a routine event and specific controls must be in place to ensure firefighter safety.

Specific controls that assist in assuring firefighter safety are mandated through Federal Regulations, as in 29 CFR 1910.134, which primarily addresses the need for standby and rapid intervention teams presence when firefighters enter immediately dangerous to life and health (IDLH) environments (United States Occupational Health and Safety Administration, n. d.). National consensus standards such as NFPA 1500 all require fire departments to have incident management systems in place and minimum standards for companies conducting fire attack (National Fire Protection Association, 2007). It must be noted, however, that NFPA standards are consensus standards; they are not mandatory.

The Center for Disease Control's National Institute for Occupational Safety and Health (NIOSH) tracks and investigates firefighter line of duty death (LODD) reports with the goal of reducing firefighter fatalities. LODD reports contain timelines of the incident, causal factors, acts of commission and omission, and items that all departments should consider in order to prevent a firefighter death in their particular locale. When related to structural firefighting, a number of NIOSH reports suggest that departments, "enforce Standard Operating Procedures (SOPs) for structural firefighting;" (National Institute of Occupational Safety and Health, 2005) or to "review and revise existing standard operating procedures for structural firefighting." (National Institute of Occupational Safety and Health, 2004) Standard Operating Procedures (SOPs) or Standard Operating Guidelines (SOGs) serve as a guide for decision-making. While most would argue that procedures are more rigid than guidelines, the intent of both is to ensure consistency of action and provide guidelines for a given activity (Cook, 1998, p. 3). Though the scope of the paper addresses research related to specific policies that

imply rigid step-by-step actions, in certain instances where a department consulted does not have specific policies, the word “practices” was used interchangeably. The intent of this applied research project is to satisfy the United States Fire Administration Operational Objective Number Three, which is to “Reduce the loss of life from fire-related hazards, particularly among firefighters” (United States Fire Administration, 2005, p. 3).

### LITERATURE REVIEW

The literature review related to this applied research project includes information compiled from the National Fire Academy’s Learning Resource Center (LRC), periodicals gleaned from the Lincoln Fire and Rescue Training Division Library, and sources located online through search engines.

The initial basis for conducting the literature review for this research stemmed from a reconstruction committee report that was published after a structure fire in Washington DC led to the deaths of two firefighters. Washington DC Fire and EMS utilizes a strict set of standard operating procedures for structural firefighting based upon occupancy types, responding apparatus types and their duties, and staffing. The report cites two critical instances where firefighting crews failed to follow departmental standard operating procedures related to firefighting operations; these failures resulted in the Incident Commander losing pre-established communication and coordination. The loss of these two functions resulted in fire attack and support crews performing duties without consideration of their effect on the overall operation; hose lines were not placed in tactically advantageous positions and ventilation of the fire structure without knowledge of firefighter locations inside the building led to a flashover that fatally

burned two firefighters operating on the first floor. Furthermore, this overall lack of coordination and communication allowed fire conditions to deteriorate to a point where rescuing the downed firefighters became difficult. *Freelancing*, or firefighters assuming roles that they want to perform rather than those they are supposed to perform, contributed to the overall failure of the Incident Commander to accurately track who was supposed to be performing specific functions on the fire scene (Report from the Reconstruction Committee, n.d.). It must be noted that while the reference from this incident stems from an incident that occurred in 1999, it creates an idea for exploration of more recent literature for this applied research project.

Retired District of Columbia Fire Department Deputy Chief Robert Bingham experienced a near-miss in a basement fire, which became the impetus for his department to develop SOPs. His assertion is that different opinions on how fires should be orchestrated led to potentially hazardous conditions (Bingham, 2004, p. 36). After experimenting with numerous policies, the department found that SOPs led to more consistent actions which led to greater fire scene accountability (Bingham, 2004, p. 38). He further reports (2004, p. 39) that the SOPs allowed for deviation if a member on scene was able to justify the need and articulate the need to command.

A common recommendation by the National Institute of Occupational Safety and Health (NIOSH) is to “develop and implement standard operating procedures (SOPs) addressing emergency scene operations, including specific procedures for basement fires;” and “enforce standard operating procedures (SOPs) for structural firefighting.” (NIOSH, 2004 and 2006) These recommendations are often based upon relationships between one specific portion of the firefighting operation, such as applying water to the

fire and the importance of coordinating supporting functions to water application, such as ventilation. NIOSH (2004) states that "...basement fires present a complex set of circumstances, and it is important that SOPs are developed and followed to minimize the risk of serious injury to firefighters." Furthermore, NIOSH (2005) asserts that the relationship between communication, ventilation, attack crew positioning, and other tactical decisions place the onus on fire departments to conduct frequent training to ensure that firefighters are complying with SOPs that are already in place.

Cincinnati experienced a firefighter line of duty death in March of 2003 at a single-family dwelling structure fire. The reconstruction and investigation committee cited specific breakdowns in the areas of crew integrity, company officer supervision of fire fighting operations, supervision of inexperienced firefighters on the fire ground, portable radio usage and availability, risk management profiles, accountability, incident safety operations, and incident benchmarks (Laidlaw Investigation Committee, 2004, p. 112). It is understood that even one mistake in any of the aforementioned areas can lead to an injury or death; the Armstrong report made specific recommendations related to updating the Cincinnati Fire Department's Structure Fires policy in order to prevent the likelihood of similar circumstances occurring in the future. Specifically, the committee recommended upgrades to the department's structure fires policy in relation to engine/ladder operations, command officer responsibilities, and fire attack principles, strategies, and tactics (Laidlaw Investigation Committee, 2004, p. 127). The report cites particularly that these upgrades require a great deal of training in decision making skills, adding to the importance of written policies and/or procedures to serve as a guide for decision making. It notes that one specific policy was not the impetus for change; rather

numerous policies that share a relationship in regard to safe fire scene operations required a complete overhaul.

The functions, communication, and coordination required at the scene of a fire parallel team sports activities. Sendelbach (2005, p. 60) states,

to be effective in competitive team sports, a group of individuals must work together to achieve a common goal. The fireground is no different: All units and personnel working at the incident scene must work collectively under the direction of a single-incident commander to achieve a safe and effective outcome.

He further reports, “Unfortunately, some departments and members still operate without a pre-designated game plan—they make it up as they go.” (Sendelbach, 2005, p. 60)

Captain Mike Dugan (2007, p. 38) of New York City Fire Department adds a football analogy:

What would happen if your favorite NFL football team played this way during the Super Bowl? What if they showed up for the game without a plan or failed to re-evaluate their plan during halftime? What would happen if they didn’t assign specific players to specific positions? Fans would be calling for the coach’s head in the local papers the next day.

The relevance is that careful planning prior to the incident must take place. Fire within structural compartments (rooms) responds both positively and negatively to air currents, weather, and water application. Firefighters are required to conduct activities in these hostile situations, however the danger is increased when personnel operating outside do not take their activities into consideration related to fire behavior. The symbiotic relationship between firefighters applying water inside the structure and firefighters ventilating the structure from the outside to lift the smoke and heat away from them creates a more tenable environment that leads to fire control. In order to achieve fire control, Dugan (2007, p. 39) states, “Without a plan and a team qualified to carry out the plan...it will be dangerous if there’s no plan in place.” He further asserts in the literature

that the coordination of who will do what, where they will do it, and when they will perform the tasks are critical to achievement of overall fire fighting objectives. A plan must be in place so that all personnel know their roles and where they fall into the big picture. Procedures and guidelines must be backed up with training to reinforce the steps that need to be taken.

Firefighting operations also parallel military doctrine. Due to the paramilitary rank structure of most fire departments, and the fact that the two disciplines are required to accomplish missions during high-stress and intense situations, much can be learned from military philosophy. In the military, command and control is crucial to the success of mission accomplishment. Effective planning, communication, organization, and training must come together in order to execute the commander's intent. Considerations such as human psychology, enemy position and behavior, and performance under stress play critical roles in the guidance of military units. Military procedures are considered an element of the decision-making process that is designed to be a source of organizational competence. They are useful in coordination among elements of the unit that must accomplish repetitive tasks. Performing these tasks on a procedural basis must be carefully undertaken however; if they are not applied appropriately, ineffective performance can result (United States Marine Corps, n. d.).

The critical factor behind military procedures is that they are utilized to streamline decisions. In other words, "they should be designed for simplicity so that we can master them easily and perform them quickly and smoothly under conditions of extreme stress." (United States Marine Corps, n. d., p. 10). Any operational undertaking at the scene of a

fire involves the same elements of stress, and thus requires some form of procedural outline to assist in the decision-making process and maintain situational awareness.

Situational awareness while operating under duress is a difficult achievement on the fire ground. As stated earlier, an overall lack of command and control can be directly attributed to a lack of awareness as to the progression of a fire within the building. Interior firefighters deployed inside a structure only see a small piece of the overall fire ground picture; this is also true of firefighters and incident commanders and support personnel operating on the exterior of the structure. In all cases, rapid and accurate decisions must be made in order to achieve the overall objectives of life safety, incident stabilization, and property conservation. Decisions are often based upon experience (or through training) or situational orientation. If a guide to decision-making does not exist, often the firefighter will make a “best guess” based upon what they do know. The military refers to this decision-making process as the *OODA Loop*, for observe, orient, decide, and act. In other words, the decision-maker observes the situation and attempts to process what the situation means (orientation). A decision is then made based upon those two factors, which leads to subsequent action. The feedback from the results of the action causes the cycle (loop) to repeat itself continuously in order to attain situational equilibrium: the desired outcome. In time, this leads to understanding; this is considered situational awareness. Information processed with the assistance of procedural guides or protocols allows for more effective and desired responses (United States Marine Corps, n. d., p. 1).

Further exploration into procedural emphasis to attain situational awareness showed that the general aviation has found a lack of situational awareness as a factor in

catastrophic and near catastrophic aircraft incidents. Endsley and Garland (2000, p. 2) report that improper procedures play a factor in 54% of dangerous situations that result in pilot error. They further suggest that increasing levels of pre-flight preparation benefitted flight crews and enabled them to handle critical situations or prevent them altogether. Procedures, however, are not the sole determinant of a safe and successful outcome, but rather serve as a foundation for safe operating. Endsley and Garland (2000) warn that “those [pilots] who used procedural-based strategy performed more poorly. The ability to accurately assess the importance and severity of events and tasks is an important component of [situational awareness].” This means that pilots following procedures in the air tend to perform less than optimally; pilots who spend a great deal of time preparing pre-flight are able to anticipate and overcome significant events more readily. In short, aside from gaining decision-making skills through experiential learning, pre-flight preparation (training) and planning (procedures) allows pilots to anticipate and address critical tasks more effectively.

An element of decision making related to developing procedural expectations at the scene of a structure fire relate to Lloyd Layman’s RECEO acronym. RECEO stands for rescue, exposure protection, confinement (of the fire), extinguishment, and overhaul. Corporandy (2000, ¶2) asserts that Layman’s development of the RECEO acronym streamlines the decision-making process in order for firefighters to prioritize strategic objectives at all types of fire emergencies. Many departments utilize the RECEO acronym as the foundation for their structural fire tactical operations.

The United States Forest Service recognized the need to reduce risks and enhance safety in the wildland firefighting arena. In order to reduce these risks, they conducted an

overall change in doctrine, or philosophy, based on the input of all levels of the organization. Doctrine, per Harbour (2007, p. 37) provides principles of operation for every part of a particular organization and establishes an operational environment. He further suggests that turning doctrine into practice involves three distinctive phases: understanding, validating, and implementing. The overall doctrine of an organization establishes the foundation from which it can then build upon policies and procedures, and thus standard practices.

The fire service related publications based upon standard operating procedures (SOPs) delineate the differences between guidelines, policies, and procedures. Cook (1991, p. 1) describes a guideline as a statement of policy by a person or group having authority over an activity, while a policy is a plan or course of action designed to influence and determine decisions and actions. The United States Fire Administration (1999, p. 3) explains that the purpose of a policy is to ensure consistency of action, whereas a procedure is a more detailed guide to action. Smith (2008, p. 3), clarifies further, stating that policies are “clear statements of operational and performance objectives;” while procedures “are a sequence of steps required to accomplish objectives.” He further adds the element of plans as the “orderly, detailed, and predetermined schedules of procedures to be followed in response to a specific event.”

The Austin, TX Fire Department conducted one of the only published scholarly studies related to standard operating procedures on the fire ground. The study was primarily designed to determine whether or not the structure fire standard operating guidelines they had in place were followed on a consistent basis. Austin fire developed their guidelines based on what they call the “90%” rule, meaning that they are able to

apply the decision-making design of their structural firefighting guideline 90% of the time. The study assessed three factors: 1) the requirement that a company officer completes a “hot lap” (360 degree assessment of the burning structure), 2) the assurance that a rapid intervention team was in place, and 3) that the appropriate ventilation tactic was utilized for the situation. Utilizing a survey, Weinschenk and Ezekoye (2008, p. 62) were able to determine that the first two components (assessment of the structure and rapid intervention team placement) were attainable 92% and 96% of the time, respectively. They found, however, that the ventilation component was only followed 56% of the time in respect to the literal intent of the guideline. The study shows that simple tasks on the fire ground can be placed into practice, however more complicated factors that factor appropriate scene assessment, coordination, staffing, and sound experiential decision-making ability cannot necessarily require strict procedures. The assertion is that a greater depth of understanding is required to make more complex decisions.

Lincoln Fire and Rescue utilizes the term management policy, which indicates the purpose to aid in the decision-making process. The frame of reference within Lincoln Fire and Rescue’s management policies provides the intent behind numerous functions; however the broad nature of these policies requires the users to possess the ability to make decisions based upon facts, probabilities, and their own situation (Lincoln Fire and Rescue, 2003).

## PROCEDURES

The goal of this applied research project was to determine the feasibility of utilizing a singular policy for addressing firefighting operations at single-family dwelling fires by researching standard practices of fire departments similar in size to Lincoln Fire and Rescue. Descriptive research with surveys of departments of similar size and composition to LFR were utilized.

The first step in beginning this research project was to conduct a literature review. The purpose of the literature review was to locate specific writing on the topic of standard operating procedures for structural firefighting and their efficacy for utilization in operations. Other professions that require members to make critical decisions in high-stress situations (the airline industry and the military) were also consulted as to the benefits they receive from developing procedural expectations. Key components of using standard operating procedures as a guide to decision-making were addressed.

The second step was to consult a sample of fire departments that are similar in size and composition to Lincoln Fire and Rescue. An internet search was conducted to locate fire departments that were no less than half the size but no greater than twice the size of Lincoln Fire and Rescue based upon the number of stations (Lincoln Fire and Rescue has 14 stations, this set the parameters for the samples at 7 to 28 stations.) Departments on the extreme East and West Coasts of the United States were excluded from this study due to the fact that departments of similar size and composition in these areas are commonly a part of a regional fire service consortium where resources are shared across jurisdictional borders. The City of Lincoln does not border any other cities, thus requiring Lincoln Fire and Rescue to operate with a high-degree of self-sufficiency.

Combination fire departments (organizations that operate with both paid and volunteer staff) were also excluded from the survey. A random sample of 40 departments was selected, and surveys were emailed to the operations chiefs of each respective department in May of 2008. Of the 40 surveys sent, 18 were returned. Most of these departments were located in the Central United States. The purpose of the survey was to determine whether or not departments similar in size to Lincoln Fire and Rescue have SOPs for single-family dwelling fires and how their standard practices are developed. The survey sent asked questions related to whether or not their department had specific policies and procedures related to operating at single-family dwelling fires. If the respondent did not have specific procedures, they were asked what their standard practices were in regard to these types of emergencies. In addition, the surveys asked the departments how long the procedures/practices have been in place, how the procedures have been developed, and what types of deviation are allowed. The surveys also allowed responding departments to provide information on how single-family dwelling fires are addressed in the absence of procedural expectations. Questions related to the broad or complex nature of procedures within these departments were also addressed with the sample. Departments that responded were also asked for a copy of their single-family dwelling structure fires policy in the event that they were present. Contact numbers were obtained from the survey participants in the event that any answers provided were unclear. In two cases, departments utilized a specific drill manual or company evolutions book in lieu of specific structural firefighting policies; these departments were contacted via phone and email to clarify the functions of those materials.

The limitations to this research included several factors. First, the sample size for external departments was small, and less than half of those surveyed actually responded. The primary reason for the small sample was due to the fact that there are few fire departments that completely mirror Lincoln Fire and Rescue's demographics. Regional and geographical differences related to population, land area, and building construction lead to some variances in operational capabilities. Variances in rank structure limited the survey due to the fact that some departments do not divide responsibilities between administration and operations. Survey questions were broad in scope in order to reduce bias and ensure the ability to duplicate the results. The broad nature of the questions, in some cases, led to elaborate answers; in other cases, answers were very short. Some departments' definition of tactical procedures for single-family dwelling fires was also different; most departments utilize the terms procedures, guidelines, and practices interchangeably.

Even with limitations delineated, the author feels that the research can be replicated without bias. Survey questions were broad in nature in order to detect the presence (or lack thereof) of particular policies related to single-family dwelling fires and their utilization and development. In the absence of specific policies and procedures, departments were asked about current practices in order to determine if they parallel LFR operations. The research provided a significant amount of information related to how departments of similar size and composition to LFR develop their practices for single-family dwelling structure fires. Although the survey rate of return was low, the results were consistent among the respondents.

## RESULTS

The author finds the results of the research reveal interesting parallels between Lincoln Fire and Rescue and other departments of similar size. Many departments did not specifically address single-family dwelling fires in their policies, but rather utilized an overall policy/procedure for all types of structures. Some departments recognized the need to delineate specific functions for specific apparatus and individuals on the fireground, however their policies were either in their infancy or in a state of revision. In all aspects, the key element was the development of an overall doctrine, procedures and practices to define the doctrine, and then training to emphasize, enforce, and ensure practices are consistent. Where departments did not have specific procedures or guidelines, they were allowed to answer based on their practices, whether written or unwritten.

Question one revealed that most departments of similar size to Lincoln Fire and Rescue do not have specific procedures for single-family dwelling fires. Only three departments in the sample possessed standard operating procedures for fires in single-family dwellings. Of the three departments with specific policies, two gave standard company expectations for operating at single-family dwelling fires, while one department specifically outlined procedures for each responding apparatus and firefighter operating at the scene. 15 of the 18 departments report that their command procedures outline a general organizational command structure and incident priorities, however they are to be applied in all situations regardless of structure or incident type. The organizational structure, in all cases, was based upon federal mandate for National Incident Management System compliance as directed by Homeland Security Presidential Directive 5, where all

local and state governments are required to utilize the incident management system as a part of the National Response Plan (Office of the Press Secretary, The White House, 2003). The 15 departments that outlined a general organizational command structure report that they rely heavily on the decision-making abilities of their company officers to determine an incident action plan. Two departments without specific single-family dwelling policies infused the aforementioned RECEO acronym (Corporandy, 2000, ¶3) as a basis for their critical size-up and decision-making principles.

The critical elements of doctrine and training in regard to mitigating fires in single-family dwellings are well-documented with all of the surveyed departments. While most departments did not actually possess a specific procedure, three of them utilized a *drill manual* or *standard company evolutions manual* separate and distinct from their department's standard operating procedures. These manuals contain specific company evolutions, ranging from laddering practices to fire stream management, and are utilized to develop company training drills. Within the manuals are step-by-step instructions including a time element for performing each task. One department (Little Rock, AR) that utilized broad policies and procedures combined with a drill manual reported that flexibility in decision-making was maintained, while each responding firefighter was still able to maintain cognizance of their role on the fire ground and maintain proficiency in performing their duties (G. Summers, Personal Communication, August 13, 2008). Another department, while not in possession of a specific policy for single-family dwelling fires, utilized several policies that meet the requirements of the Incident Management System. The department then utilized a policy for standard company actions on the scene of all fire emergencies defining expectations for the

performance of tasks. A company operations manual supplemented their guidelines for training purposes.

16 of the 18 departments reported (in very similar fashion to Lincoln Fire and Rescue) that they did not utilize a specific policy or procedure for single-family dwelling fires. Rather, they utilized guiding principles with the Incident Management System coupled with informal expectations outlined by their chief officers.

Question two revealed, in all cases, that regardless of the presence of specific procedures that full assurance of safe operating practices is not guaranteed. All survey participants report that their operations are based upon a risk management profile. A common risk management profile quoted was “risk a lot to save ‘savable’ lives, risk a little to save ‘savable’ property, and risk nothing to save things that are already lost” (Springfield Fire Department, 2006, p. 4). All participants denoted that their safety is enhanced by some form of procedural expectations, but they instill safe decision making abilities through repetitive training scenarios. Two participants reported that they utilize training and best practices developed over time infused with the flexibility for their members to utilize common sense as a tool in the decision-making process.

Question three revealed several different methods for developing operating practices and procedures. 16 of the 18 respondents report that the Chief or Chief in charge of operations played a pivotal role in determining how crews operate on the fire ground. 8 of the 18 departments surveyed utilized chief officers or upper echelon officers to determine standard practices. Two departments utilized a committee to formulate their policies and procedures. The committees were generally comprised of intra-departmental cross-sections consisting of firefighters, company officers, and chief officers. The

committees reported utilizing procedures from other departments to determine a baseline for their practices. One department's committee profiled specific and typical structures in their city; they then broke each type of responding company's responsibilities for each type of occupancy. After the guidelines are written, a peer review within the committee is performed to determine if the guideline provides the specific information needed for conducting tactical operations (M. Bricault, Personal Communication, July 23, 2008).

Two departments utilize their training divisions to develop performance standards, which are then practiced by responding fire crews; adjustments based upon best practices are then made to determine standard operating procedures or practices.

Question 4 revealed that all departments regardless of the presence of standard procedures at single-family dwelling fires rely on company drilling in order to implement their practices. In fact, all departments that responded to the survey highlighted that departmental training and company level drilling are the primary methods in which their members learn and hone fire ground decision-making and tactical proficiency skills. 14 of the 18 departments reported that the implementation of standard practices (without a specific written procedure for single-family dwelling fires) was directly related to experiences on the training ground. In addition, the departments that utilized broad and general command principles as the basis for their single-family dwelling operations (again, in the absence of a specific single-family dwelling fire procedure) have developed their practices through post incident reviews and translated that information into practice developed through training.

Part of implementing practices and procedures involves revision. Three departments reported that their policies had not been addressed for several years and were

currently in a state of revision. Ten departments described that their policies were in place for several years without revision. Three departments review and revise their policies on an annual or bi-annual basis.

## DISCUSSION

The literature review and study results indicate that a singular standard operating procedure for single family dwelling fires is not necessarily panacea for fire fighting operations. All survey respondents reported the fact that whether or not their on scene expectations were written or provided through other methods, that a great deal of flexibility is needed in order to accomplish tactical objectives. Although respondents noted that most of their responses fall into a predictable pattern, that the need for an Incident Commander to retain flexibility in assignments was essential.

All structural firefighting operations require a solid foundation of training coupled with the ability to make the appropriate resources in order to facilitate a successful incident action plan. Due to the high-stress nature of a fire scene, the number of tasks required to accomplish a safe operation can sometimes overwhelm initial arriving units. Cook (1998) suggests that standard operating procedures should act as a guide to decision-making, but warns that the nebulous and ever-changing environment of a fire scene requires the ability to reallocate resources or change plans as more information becomes available. He further asserts that operational SOPs should provide broad expectations that allow for interpretation and flexibility. A majority of departments surveyed utilized their overall incident command procedures coupled with procedures on determining incident priorities as the framework from which they respond to all incidents. The rationalization is that some fires are small, room and contents fires, while

some fires are larger; having all resources tied into specific functions on every single-family dwelling fires not only contributes to overwhelming the incident commander, it could actually lead to duplication of efforts among crews responding. Fire departments similar in size and composition to Lincoln Fire and Rescue support utilizing command principles to determine safe operating practices.

Fire departments surveyed for this research aligned with the facts asserted by the Austin Study (Weinschenk and Ezekoye, 2008, p. 63) that complex SOPs can typically cause more confusion, and thus are not followed closely. The Austin study outlined three procedural requirements for structural firefighting: the size-up, assignment of a rapid intervention team, and determination of the appropriate ventilation tactic. The results of this study found that a broad guideline for size-up and assigning a rapid intervention team were easily accomplished. Determination of a ventilation tactic, however, required a great deal of technical knowledge, timing, and ability to adapt to the structure and fire conditions presented. This particular procedure showed that the technical aspects of firefighting operations are better left to interpretation based upon situation and experience. The United States Fire Administration (1999, p. 3) further asserts that technical information placed in SOPs typically undermines the abilities of those using them. The departments surveyed in this research project indicated that broad guidelines better suited their abilities to handle situations on a case by case basis.

Anticipation of firefighting needs at single-family dwelling fires is crucial to a safe and effective outcome. Departments that utilize specific procedures for single-family dwelling fires must conduct a comprehensive risk analysis of their response area, and then apply resources for anticipated scenarios in the typical dwellings to which they

respond. This requires a great deal of input from firefighters, officers, and committee members formulating their policies. Harbour (2008, p. 33) suggests that this process is a valid method for developing standard practices, as long as the practices are utilized as intended and that the stakeholders developing the practices realize that the document must change as enhancements become necessary.

Research performed on specific standard operating procedures for single-family dwellings revealed that development of a process for determining incident priorities and communicating assignments is more important than the actual presence of a lone procedure. Although some tasks on the fire ground are procedural, which Smith (2006, p. 18) implies is a sequence of steps; many tasks must occur concurrently and are interdependent. Most departments surveyed, rather than tying their chiefs, company officers, and firefighters into blind tasks on the scene of a fire, established their practices based upon command's wishes; the incident commander (and every person operating on the scene) is responsible for communicating their functions and intent. This communication is intended to supplement size-up cues in order to support overall decision-making.

The literature reviewed from the airline industry found that pilots involved in problematic situations actually make poorer decisions when tied to specific procedural checklists during the emergency. Endsley and Garland (2000) suggested that pilots who were able to anticipate problems in advance in order to mitigate their effects (or prevent them altogether) often developed this ability through preflight procedural preparation. This implies that while procedures are an important facet of handling emergencies, they are better placed in practice during the preparation phase of an event. Thus, training in

procedural expectations prior to actually experiencing the single-family dwelling fire will enhance a firefighter's ability to anticipate and react to issues presented on the scene.

The military has discovered that repetitive tasks can be more effectively performed when they are placed into procedure, thus lending more time to allow for more difficult and critical decision-making. Furthermore, the utilization of a specific procedure, in some cases, may preclude decision-making and lead to an ineffective outcome. Therefore, utilizing preparation in advance as a tool to assist in the decision-making process, but allowing for constant processing and flexibility to make adjustments leads to a more beneficial outcome (United States Marine Corps, n.d.). The military and the airline industry have recognized that optimal human decision-making comes from flexible decision-making aids coupled with repetitive and intense training (preparation) in order to reduce errors. The fire service can capture a great deal of information from these industries to promote safer outcomes at single-family dwelling fires.

The fire in Washington DC on Cherry Road exhibited situations where fire companies did not follow specific standard operating procedures; this led to a lack of coordination that resulted in the deaths of two firefighters. (Report from the Reconstruction Committee, 1999) It is noted through both the literature and results of the author's study that the presence of policies and procedures related to single-family dwelling fires does not guarantee safety of all firefighters, nor does it necessarily enhance the overall operation. What the policies and procedures do provide, however, is a clarification for roles and responsibilities. Dugan's (2006, p. 41) analogy to a clear delineation of responsibilities can be likened to that of a football team. The parallel is that not every firefighter on the scene gets to direct the fire stream and extinguish the fire;

every person operating on the scene has a responsibility to perform their assigned tasks in order to more effectively extinguish the fire. Two departments surveyed, while not in possession of specific procedures for single-family dwelling fires, utilized a policy describing company roles and responsibilities on the scenes of structure fires. One department utilizing a standard company role policy allowed for flexibility in decision-making and resource management on the scenes of all emergencies, but also specifically described what a company's typical responsibilities will be at a fire scene in order to prevent freelancing and duplication of efforts (S. Dubay, Personal Communication, July 23, 2008).

The overriding results of the survey are that most departments of similar size and composition to Lincoln Fire and Rescue successfully mitigate fires in single-family dwellings without the presence of a specific policy for such structures. In most cases, strong guidelines for command structure coupled with size-up cues provide responders with an ample amount of information to complete their tasks according to the situation presented. It must be noted, however, that while departments surveyed described their operations primarily as successful in addressing single family dwelling fires, the differences between chief officers and their informal policies within similar organizations was not evaluated. The survey's primary goal was to determine whether or not a single tactical procedure exists within the organizations in order to determine if Lincoln Fire and Rescue's practices for single-family dwelling fires require a procedure to maintain consistency among all responding personnel.

## RECOMMENDATIONS

Fighting fires in single-family dwellings, although the one of the most routine fire responses for many fire departments requires a great deal of coordination and training. Even with most departments not having a strict and specific set of guidelines for addressing fires in these occupancies, the research provided sufficient data to assist in addressing certain considerations in order to make operations at these occupancies safer. Lincoln Fire and Rescue, as stated earlier, utilizes an overall incident management policy that addresses size-up and assignments for all types of incidents. Additionally, federally mandated policies related to rapid intervention teams and respiratory protection for structural firefighting has also been implemented. Traditionally, different chief officers (a total of six involved in suppression) present their informal tactical expectations for how they want certain types of incidents to be handled. This leads to what some members of Lincoln Fire and Rescue refer to as “six different fire departments in one;” and, consequently, sometimes leads to the potential of operations not running smoothly. The author’s research found that a preponderance of departments similarly sized to LFR do not utilize a singular SOP to address tactical procedures at single-family dwelling fires, but, in many cases, utilize doctrine developed from practices utilized throughout the years.

Research found that stringent procedural expectations in the operational realm can sometimes lead to less than optimum decision-making abilities among participants in firefighting duties. The author found that firefighters must be given options; the determination of how these options are employed must be followed up not only by sound

decision-making, but by communication. This communication then enables other firefighters to determine their actions based upon the options presented to them.

Overall, the key component in determining safety of operations at single-family dwelling fires is having a strong training program that reinforces the necessary steps to be taken in order to mitigate these types of incidents. Therefore, the author's recommendations are threefold.

Recommendation one is for Lincoln Fire and Rescue to determine an overall doctrine, or philosophy for conducting operations at structural fires. Harbour (2007) reports that an overall policy requires three distinct steps: understanding, validation, and implementation. All levels of Lincoln Fire and Rescue must be touched to determine a unified philosophy. This environment is described as a "principles-based" and leads to creativity and understanding in aligning actions with the mission (p. 32). Validation of doctrine assists in determining how an agency approaches decision-making, which is a crucial in ensuring all documents promoting the doctrine align with rules, regulations, and laws governing fire department efforts (p. 33). Implementation involves following the rules and philosophies set by the agency; this culture does not omit the need for change or debate, but rather encourages a process for change as principles become updated (p. 34). Rather than utilize the "trickle-down" effect of philosophy passed from a hierarchical structure, the author's research found that numerous departments' practices were successfully implemented using all layers of the agency involved in operational functions. This cultivates engagement and promotes the doctrine's credibility among all ranks. Bingham (2004, p. 38) also touts that consistency issues by developing a singular philosophy should be eliminated.

Recommendation two is to establish a general management policy for structural firefighting operations based upon the aforementioned doctrine. The policy will serve as a general guideline to assist in decision making at structure fires. It should be written to allow flexibility based upon the situation presented, but define the roles of each component on the fire scene to prevent duplication of efforts. Brunacini (2008) suggests that general policies allow everyone to determine the differences between routine and critical information. Coupling the critical communication, which is often a causal factor in line of duty deaths, with roles and responsibilities of firefighters on the scene will streamline the process of accountability and task performance on the fire ground. The Incident Commander will be able to focus more on forecasting potential issues that could affect firefighter safety rather than play “catch up” on the scene. Bingham’s (2004, p. 38) assertions parallel this philosophy in that the Incident Commander can see the big picture rather than get involved in task-oriented functions. Furthermore, the study conducted by Weinschenk and Ezekoye (2008) determined that complex matters were better facilitated using training and not necessarily appropriate as a standard operating procedure.

The third, and most critical recommendation, is the establishment of training standards based upon the philosophy and policy guidelines that delineate company responsibilities. While most departments surveyed during this research project did not have specific policies for fighting fires in single-family dwellings, three utilized a drill manual that allowed companies to practice timed evolutions based upon their specific role and responsibility on the fire scene. The standards that need to be established should be based upon the skill set of the company member performing the task, promotional or positional advancement should be based upon the ability to perform these evolutions. For

instance, a firefighter on an engine company should be expected to deploy and operate a hose line within a certain amount of time with proficiency; a firefighter on a truck company should be expected to perform forcible entry and ventilation evolutions. A fire apparatus operator should have the ability to operate a pump and utilize an aerial ladder device. Finally, the company officer skill set should be the most advanced; they must have the ability to perform the functions of their company, but also conduct size-up of a burning structure and deploy company members as appropriate. The company officer skill set should include intense training in decision-making based upon the incident presentation using the department's general philosophy and policies as a guide. Intense training should be incremental; it starts at the lowest common denominator and utilizes skill-building in a team environment to enhance more effective and safe operations. This training regimen will also allow department leadership to determine strengths and weaknesses in the overall doctrine and make changes as necessary.

Singular standard operating procedures for single-family dwelling fires are not the complete answer to firefighter safety and survival. They are, however, a component of a doctrine that aids in simplifying intense and complex situations. Critical factors such as aligning all department members with a unified philosophy rather than six; and coupling this philosophy with guidelines promoting flexibility and enhanced skill performance must be explored further to determine how safe operations can be conducted.

## APPENDIX A

## Definitions

|                         |   |
|-------------------------|---|
| Battalion Chief         | Chief responsible for command in a certain geographical area  |
| Captain                 | Supervisor of an engine or truck company  |
| Deputy Chief            | Chief officer responsible for a battalion or division   |
| Engine Company          | Fire apparatus and crew that pumps water and utilizes fire streams  |
| Fire ground             | Fire scene  |
| Incipient fire          | Fire in its initial stages  |
| Medic Unit              | Ambulance   |
| Rapid intervention team | Team of firefighters that stands by to rescue downed firefighters   |
| Size-up                 | Assessment of the scene   |
| Technical Rescue        | Special responses such as high-angle, trench, or confined space   |
| Truck Company           | Fire apparatus and crew that utilizes ladders and performs rescue   |
| Two-in, two-out         | Federal mandate requiring two personnel to standby outside an immediately dangerous to life and health environment if there are personnel operating within said environment |

## APPENDIX B

## Survey

## Procedures/Practices/Guidelines for Single-Family Dwelling Fires

Name:

Fire Department:

Please answer the following questions:

- 1) Does your department have specific written policies/procedures/guidelines for operating at single-family dwelling fires?
- 2) If so, how long have they been in place?
- 3) If not, how do you address tactical procedures at single-family dwelling fires?
- 4) How are your policies/procedures/guidelines/practices developed?
- 5) How often are they revised/updated?
- 6) How do you train in them?
- 7) How do you ensure compliance?
- 8) Is deviation allowed?
- 9) What happens if deviation from policies/procedures/guidelines/practices occurs?
- 10) Are policies/procedures/guidelines/practices based upon common occupancy types, fire conditions presenting, or both?

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